ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for June, 1893, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on Chart II by isobars.

Chart VI exhibits the normal distribution of atmospheric pressure and prevailing wind-directions over the United States for June. The publication of the charts of this series is preliminary to the publication by the Weather Bureau of specially prepared data and charts showing meteorological and climatic features and conditions of the United States.

In June, 1893, the mean pressure was highest along the Oregon and northern California coasts, where it was 30.10, and the mean readings were above 30.00 over the Atlantic coast states. The mean pressure was lowest over the west part of the southern plateau and in the region north of North Dakota, where it was below 29.75, and the mean values were below 29.80 over the greater part of the southern plateau region and generally over the Dakotas and eastern Montana.

A comparison of the pressure chart for June, 1893, with that of the preceding month shows a general increase of pressure in the Mississippi Valley and thence to the Atlantic coast, and over the north Pacific coast states. In the north-central districts and thence to the middle and south Pacific coasts the mean pressure was lower than for May, 1893. The greatest increase of pressure occurred over Pennsylvania, New York, and New England, where the mean readings were .10 to .14 higher than for the preceding month, and the most marked decrease in mean pressure was noted over the Dakotas and western Minnesota, where the mean values were 10 to .13 lower than for May, 1893.

The mean pressure was above the normal over the middle Atlantic and New England states, the eastern and southern lake regions, and the Ohio, middle Mississippi, and lower Missouri valleys. The mean pressure was also above the normal from the middle and north Pacific coasts over the northern plateau region. From Lake Superior to eastern Montana and thence over the Rocky Mountain and plateau regions to Texas and the south Pacific coast the mean pressure was below the normal. The mean readings were also below the normal over the Southeastern States. The greatest departure above the normal was reported over New Brunswick and Nova Scotia, where the mean pressure was .10 to .11 higher than the June normal, and the most marked departure below the normal pressure was noted from Lake Superior over the eastern Dakotas, and in areas from the middle Gulf states to the south Pacific coast, where the mean values were about .05 lower than usual.

HIGH AND LOW AREAS.

The paths of areas of high and low barometric pressure over the United States and Canada during June, 1893, are shown on Charts IV and I, respectively, and some of the more prominent characteristics of the high and low areas are given in the table at the end of this chapter.

HIGH AREAS.

Five high areas appeared, the average number traced for June during the last 19 years being 6. Of the high areas traced for the current month 3 appeared on the north Pacific coast, traversed the continent, and disappeared off the middle and south Atlantic coasts, one advanced from Manitoba over the Lake region, and passed thence over the Canadian Maritime Provinces, and one moved from the middle Rocky Mountain region to the south Atlantic coast. The average velocity of the high areas was about 2 miles per hour greater than usual. The following is a description of the high areas whose tracks are plotted on Chart IV:

I.—The month opened with this high area central off the north Pacific coast, where it remained nearly stationary until the morning of the 3d. On that date the high area moved eastward over the northern Rocky Mountain region, with pressure above 30.20 at the morning report of the 4th. Moving southeastward over the Rocky Mountain districts, with pressure rising above 30.30, this high area was attended the morning of the 5th by temperature falling to 34° at Cheyenne, Wyo., and light frost in southeastern Wyoming and northern Colorado. The morning of the 6th the barometer was high from the Mississippi River to the middle and southern Rocky Mountain districts, a fall in temperature of 10° to 20° was shown over the northern lake region, and heavy frost was reported in southern Wyoming and northern Colorado. During the 6th the center advanced to western Missouri, and a marked fall in temperature occurred in the Atlantic coast states, the Ohio Valley, and the Lake region. Reports of the morning of the 7th show this high area central over the middle Mississippi valley, and a general fall in temperature in the Atlantic coast states, the Ohio Valley, and the eastern lake region. Moving eastward this high area passed off the south New England and New Jersey coasts during the 8th, with pressure rising above 30.30 over the middle Atlantic and south New England states at the morning report.

II.—Appeared over the Red River of the North Valley the morning of the 9th, with a fall in temperature of 10° to 20° over the Dakotas and Minnesota, and by the evening report of that date had advanced north of Lake Superior, with a fall in temperature of more than 20° over Upper Michigan. During the 10th this high area remained nearly stationary over the upper lake region, and the temperature fell 15° to 25° over the southern lake region. By the evening of the 11th the center had advanced to Lake Erie, and the temperature had fallen about 10° over the interior of the middle Atlantic and New England states. During the 12th this high area remained nearly stationary over Lake Erie, with pressure rising to 30.20 at the morning report. On that date the temperature fell about 10° along the immediate middle Atlantic and New England coasts. By the morning of the 13th the high area had moved rapidly eastward over the Canadian Maritime Provinces, with pressure rising above 30.20.

III.—Apparently developed on the eastern Rocky Mountain slope during the 16th, and at the evening report of that date the pressure was relatively high from extreme northwestern Texas to the Red River of the North Valley. During the 17th the high area moved over the western lake region, and during the 18th advanced over the southern lake region. By the evening of the 19th this high area had passed southeastward off the Carolina coast, with pressure rising above 30.20.

IV.—Moved southeastward from the north Pacific coast to Idaho during the 21st. On that date the temperature fell 20° from central Nebraska over southern Minnesota. During the 22d the high area advanced to the lower Missouri valley, and a marked fall in temperature occurred in the Atlantic coast states, the Lake region, and the Southwest. During the 23d this high area advanced over the Ohio Valley, and passing thence slowly southward disappeared off the south Atlantic coast during the 25th.

V.—Appeared off the California coast on the 22d, with pressure above 30.20 and a temperature fall of 10° to 20° over the north Pacific coast states. By the evening of the 23d this high area had moved northward off the Washington coast, and the temperature had fallen 10° to 20° from the middle plateau region to the British Northwest Territory north of eastern Montana and the Dakotas. During the 24th the high area advanced to the northern Rocky Mountain region, and the temperature fell about 10° on the middle-eastern slope of the Rocky Mountains. Moving east-southeast the center

reached Iowa by the evening of the 25th, and passed thence to the extreme upper Mississippi valley by the night of the 26th. During the 27th the high area remained nearly stationary over the Lake Superior region, and on the 28th moved slowly eastward north of the Lake region. By the morning of the 29th this high area had passed southeastward off the middle Atlantic coast, and at the close of the month the pressure was high along the Atlantic coast from Nova Scotia to Florida.

LOW AREAS.

The average velocity of low areas in June is about 25 statute miles per hour, the velocity for May, June, and July being the lowest noted for the year. The low areas of June generally appear over the plateau or Rocky Mountain regions, are usually ill-defined and of small energy, and the tracks are confined principally to districts lying west of the Mississippi and north of the Ohio rivers.

Ten low areas appeared during June, 1893, the average number traced for the corresponding month of the last 21 years being 9.2. Of the low areas traced for the current month, 4 first appeared north of Montana, 3 apparently developed over the middle or southern Rocky Mountain and plateau regions, one occupied the middle Mississippi valley at the opening of the month, one moved from the Gulf of Mexico northeastward along the Atlantic coast, and one passed eastward over the southern lake region and thence off the New England coast. One of the low areas from the British Northwest Territory reached the Gulf of Saint Lawrence, and one apparently dissipated over the Dakotas. One of the low areas from the Rocky Mountain region disappeared over the Gulf of Mexico, one moved northward over the Saskatchewan Valley, and one disappeared by an increase of pressure over the extreme upper Mississippi valley. The low area from the middle Mississippi valley reached the Gulf of Saint Lawrence. The average velocity of the low areas was about 2 miles per hour less than the average velocity of low areas traced for June of preceding years.

The following is a description of the low areas whose tracks are plotted on Chart I:

I.—Was a continuation of low area XI for May, 1893, and at the opening of the month occupied the middle Mississippi valley, with pressure below 29.60. The pressure was also low over the Dakotas and the southern Rocky Mountain region. The evening report of the 1st showed low pressure in the Southwest and a trough of low pressure extending from the upper Mississippi valley to the region north of Montana. On that date rain fell generally in the central valleys, the Lake region, and the Northwest, the rainfall being heavy in the south Atlantic and east Gulf states, and thunderstorms occurred in Virginia, North Carolina, the Ohio Valley and Tennessee, Lower Michigan, the Dakotas, and Nebraska. During the 2d this low area advanced to Lake Superior and thence to Manitoba, with pressure below 29.60, rain fell generally over the country east of the Rocky Mountains, except in New England, thunderstorms occurred in the middle and south Atlantic states, the lower lake region, the Ohio Valley and Tennessee, the Dakotas, and Nebraska, and local storms were reported in eastern Texas.

The storm-center remained nearly stationary over Manitoba during the 3d, rain fell in the Atlantic coast states, the Lake region, the Ohio, Mississippi, and Missouri valleys, and thunderstorms were reported in the Lake region, the Ohio Valley and Tennessee, and the upper Mississippi valley. By the evening of the 4th the center of disturbance had advanced to Upper Michigan, rain continued in the north-central and northeast districts, and thunderstorms occurred in the middle Atlantic states, the Ohio Valley and Tennessee, the Lake region, and the upper Mississippi valley. During the 5th the storm-center advanced from Lake Superior to the region north of Lake Ontario, with rain from the middle and lower Mississippi river to the middle Atlantic coast, thunderstorms occurred in the middle Atlantic states and the lower lake region, and local windstorms were reported in Tennessee and Ohio. During the 6th this low area disappeared over the north part of the Gulf of Saint Lawrence. On that date the rain area contracted over the Atlantic coast states, and thunderstorms, with heavy rain, were reported from Maine to North Carolina.

II.—Advanced from the southern plateau region, and on the 3d was central near extreme northwestern Texas, with pressure falling below 29.60. During the 4th the center moved over Oklahoma, and thence to central Texas, with heavy rain in areas in the Southwest, and during the 5th disappeared over the Gulf of Mexico, attended by heavy rains in the middle Gulf states, in Tennessee, Kentucky, and Arkansas, and on the Texas coast.

III.—Appeared over extreme northern Alberta the morning of the 6th and moved slowly southward, with pressure below 29.50 at the evening report. During the 7th the center of disturbance moved southeastward over the middle Missouri valley, with severe windstorms in the middle Missouri valley, and thunderstorms in South Dakota. Passing thence northeastward over Minnesota during the 8th this low area was attended by thunder and wind storms from the Dakotas and Iowa over Minnesota and Upper Michigan. During the 9th this low area moved eastward north of the Lake region, its passage being generally unattended by precipitation. The night of the 9th thunderstorms were reported in the southwestern lake region and the extreme upper Mississippi valley and on the southeast New England coast. By the morning of the 10th the storm-center had advanced over the lower Saint Lawrence valley.

IV.—Apparently developed in the upper Mississippi valley during the 10th, and at the evening report was central near Sandusky, Ohio. On that date severe thunderstorms, with heavy rain, occurred in Lower Michigan, northern Illinois, northern Indiana, southern Wisconsin, and northeastern Iowa. During the 11th the center of disturbance passed eastward off the New England coast, with thunderstorms in New York and the lower lake region.

V.—Appeared over Alberta on the 8th and remained nearly stationary north of Montana during the 9th and 10th, with pressure falling below 29.30 at the evening report of the 10th. On the 9th thunderstorms were reported in South Dakota, Nebraska, Kansas, and Iowa. During the 10th the temperature rose 10° to 20° in the Northwest and no precipitation was reported in that region. By the night of the 11th this low area had advanced over the Dakotas and Manitoba, and southerly gales prevailed throughout the Missouri Valley. During the 12th the center of disturbance remained nearly stationary over the Dakotas, and severe thunderstorms were reported in the upper Mississippi valley. By the morning of the 13th the storm-center had apparently recurved westward and united with number VI.

VI.—Apparently developed over the middle plateau region during the 12th and the evening report of that date showed pressure 29.38 at Salt Lake City, Utah. During the 13th the center of disturbance passed to the region north of the Dakotas, with thunderstorms in the middle and upper Mississippi and Missouri valleys. During the 14th the low area disappeared by an increase of pressure over the Saskatchewan Valley.

VII.—Appeared over the middle Rocky Mountain region the morning of the 14th, and moved thence slowly eastward over South Dakota, Nebraska, and Kansas during that date, with severe thunder, rain, and hail storms from Illinois and Wisconsin to the Missouri Valley and middle Rocky Moun-

tain region. During the 15th this low area disappeared by an increase of pressure over the extreme upper Mississippi valley. On that date thunder and hail storms were reported in the Ohio, upper Mississippi, and Missouri valleys and the southern lake region.

VIII.—Appeared over the eastern part of the Gulf of Mexico the morning of the 15th, and by the evening report of that date had advanced to a position near Jacksonville, Fla., with gales and heavy rain along the south Atlantic coast. During the 16th the storm-center moved slowly northeastward along the south Atlantic coast, with pressure falling below 29.60. The rain area extended to the south New England states, heavy rain fell along the Carolina coast, and northeast gales prevailed along the middle Atlantic and south New England coasts. During the 17th this low area remained nearly stationary off the middle Atlantic coast, apparently decreasing in energy. Rain, followed by clearing weather, was reported in the middle Atlantic and New England states, and northeast gales continued along the middle Atlantic and south New England coasts. During the 18th this storm passed northeastward beyond the region of observation.

IX.—Moved southeastward over Montana the night of the 16th, and remained nearly stationary over southeastern Montana, with pressure below 29.60, during the 17th. During the 18th and 19th this low area remained nearly stationary over the Dakotas, with temperature 10° to 20° above the normal in the Missouri and upper Mississippi valleys. On the 19th severe thunderstorms were reported in the middle Mississippi valley. During the 20th the storm-center moved slowly eastward over the Dakotas, the temperature continued exceptionally high in the middle Missouri valley, Kansas, Nebraska, and eastern Colorado, and thunderstorms were reported in the middle Mississippi, lower Ohio, and lower Missouri valleys, and the southwestern lake region.

The morning of the 21st a trough of low pressure extended from Minnesota and Manitoba to northwestern Texas, with two cyclonic centers, one over southern Minnesota and the other near Dodge City, Kans. By the evening report of the 21st this trough of low pressure had moved eastward, and two centers of disturbance appeared, one over northern Lake Michigan and the other over southeastern Kansas. On that date thunderstorms were reported from the lower Missouri valley to the middle Atlantic coast, and severe local storms occurred in Iowa, Missouri, and eastern Kansas.

During the 22d the storm-center advanced eastward north of the lower lakes, with pressure below 29.50, a secondary storm appeared over New Jersey, and thunderstorms, with heavy rain, occurred over the middle and south Atlantic and south New England states, and the middle and upper Ohio valleys. During the 23d this low area apparently disappeared by an increase of pressure over the Saint Lawrence Valley. Low area IX*b*, which appeared over New Jersey, apparently passed southeastward south of Nova Scotia, and heavy rain and high northeast winds prevailed along the New England coast.

X.—Appeared over the northern plateau region and moved thence over Alberta by the evening of the 22d. During the 23d this low area advanced to Manitoba with pressure below 29.40, and the evening of that date a secondary development appeared over southwestern Kansas; severe gales prevailed over the Western and Northwestern States, and destructive thunder and hail storms were reported in Kansas and western Iowa. During the 24th the center of disturbance advanced to Lake Superior with a marked decrease in energy, and low area IX*a* disappeared by an increase of pressure over Kansas and Missouri. During the day and night of the 25th this low area moved eastward north of the Lake region, attended by thunderstorms in the Ohio Valley and Tennessee, and the lower lake region. The morning of the 26th a trough of low pressure extended from eastern Ontario over the middle Atlantic coast, with two cyclonic centers, one near the mouth of Chesapeake Bay and the other near Rockliffe, Ont. During the 26th heavy rain fell on the middle Atlantic coast, and thunderstorms were reported in the middle Atlantic states and the lower lake region. During the 27th this trough of low pressure moved eastward off the coast.

From the 25th to the close of the month, short-lived low areas, not traced, caused severe thunderstorms at points in the Western States and the central valleys.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.	Maximum pressure change in 12 hours, maximum abnormal temperature change in 12 hours, and maximum wind velocity.									
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.
High areas.		°	°	°	°	*Days.*	*Miles.*		*Inch.*			°					
I	3	48	124	41	75	5.0	22	Pueblo, Colo.	.34	4	Oswego, N.Y	18	6	Pueblo, Colo.	n.	36	4
II	9	49	98	44	65	4.0	21	Winnipeg, Man	.50	9	Parry Sound, Ont.	28	10	Sandy Hook, N.J	e.	26	13
III	16	42	100	41	82	2.5	17	Rockliffe, Ont	.24	18	Prince Arthur, Ont	12	17	Titusville, Fla	ne.	38	19
IV	21	46	125	33	82	4.0	31	Wichita, Kans.	.42	22	Dodge City, Kans	18	22	Amarillo, Tex.	s.	24	22
V	23	47	125	47	80	5.0	23	Salt Lake City, Utah	.36	23	Qu'Appelle, N.W.T	22	23	Chicago, Ill.	ne.	20	27
Mean						4.1	23		.37			20				29	
Low areas.									Fall.			Rise.					
I	1	39	91	49	72	5.0	23	White River, Ont.	.20	2	Green Bay, Wis	3	2	Chicago, Ill.	ne.	48	1
II	3	37	103	26	97	2.0	20	Pueblo, Colo.	.26	2	Pueblo, Colo.	13	2	Dodge City, Kans	se.	40	3
III	6	53	114	51	66	4.0	29	Medicine Hat, N.W.T.	.48	6	Havre, Mont.	24	6	Fort Canby, Wash.	s.	51	6
IV	10	42	83	43	71	1.0	27	Sandusky, Ohio	.16	10	Raleigh, N.C	7	10	Buffalo, N.Y.	sw.	56	11
V	8	53	115	45	100	4.0	13	Prince Albert, N.W.T.	.42	10	Rapid City, S.Dak	22	11	Moorhead, Minn.	se.	38	11
VI	12	40	113	52	103	1.0	38	Qu'Appelle, N.W.T	.44	13	Denver, Colo	13	12	Huron, S.Dak *	se.	44	13
VII	14	41	103	44	95	1.0	23	Kansas City, Mo	.16	14	Chattanooga, Tenn	13	14	Amarillo, Tex.	s.	56	14
VIII	15	28	86	41	68	3.0	20	Savannah, Ga	.24	15	New York, N.Y.	16	18	Southport, N.C.	s.	55	16
IX	17	46	106	47	75	6.0	12	Prince Albert, N.W.T.	.30	17	Duluth, Minn.	32	18	Fort Hill, S.C	w.	60	22
X	22	53	114	46	77	3.5	24	Lander, Wyo	.42	22	Miles City, Mont	20	22	Fort Buford, N.Dak.	w.	56	23
Mean						3.0	23		.31			16				50	

* Pikes Peak, Colo., sw., 86, 13th.